

# **Northern Cook Inlet Chinook and Coho Salmon Escapement Surveys for 2013 - 2015**

by

**Samantha Oslund**

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June 2013

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Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



## Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)		General		Mathematics, statistics	
centimeter	cm	Alaska Administrative Code		all standard mathematical signs, symbols and abbreviations	
deciliter	dL		AAC		
gram	g	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	alternate hypothesis	H <sub>A</sub>
hectare	ha			base of natural logarithm	<i>e</i>
kilogram	kg	all commonly accepted		catch per unit effort	CPUE
kilometer	km	professional titles	e.g., Dr., Ph.D., R.N., etc.	coefficient of variation	CV
liter	L			common test statistics	(F, t, $\chi^2$ , etc.)
meter	m	at	@	confidence interval	CI
milliliter	mL	compass directions:		correlation coefficient (multiple)	R
millimeter	mm	east	E	correlation coefficient (simple)	r
<b>Weights and measures (English)</b>		north	N	covariance	cov
cubic feet per second	ft <sup>3</sup> /s	south	S	degree (angular )	°
foot	ft	west	W	degrees of freedom	df
gallon	gal	copyright	©	expected value	<i>E</i>
inch	in	corporate suffixes:		greater than	>
mile	mi	Company	Co.	greater than or equal to	≥
nautical mile	nmi	Corporation	Corp.	harvest per unit effort	HPUE
ounce	oz	Incorporated	Inc.	less than	<
pound	lb	Limited	Ltd.	less than or equal to	≤
quart	qt	District of Columbia	D.C.	logarithm (natural)	ln
yard	yd	et alii (and others)	et al.	logarithm (base 10)	log
		et cetera (and so forth)	etc.	logarithm (specify base)	log <sub>2</sub> , etc.
<b>Time and temperature</b>		exempli gratia		minute (angular)	'
day	d	(for example)	e.g.	not significant	NS
degrees Celsius	°C	Federal Information Code	FIC	null hypothesis	H <sub>0</sub>
degrees Fahrenheit	°F	id est (that is)	i.e.	percent	%
degrees kelvin	K	latitude or longitude	lat. or long.	probability	P
hour	h	monetary symbols		probability of a type I error	
minute	min	(U.S.)	\$, ¢	(rejection of the null hypothesis when true)	$\alpha$
second	s	months (tables and figures): first three letters	Jan.,...,Dec	probability of a type II error	
<b>Physics and chemistry</b>		registered trademark	®	(acceptance of the null hypothesis when false)	$\beta$
all atomic symbols		trademark	™	second (angular)	"
alternating current	AC	United States		standard deviation	SD
ampere	A	(adjective)	U.S.	standard error	SE
calorie	cal	United States of America (noun)	USA	variance	
direct current	DC	U.S.C.	United States Code	population sample	Var var
hertz	Hz				
horsepower	hp				
hydrogen ion activity (negative log of)	pH				
parts per million	ppm	U.S. state	use two-letter abbreviations		
parts per thousand	ppt, ‰		(e.g., AK, WA)		
volts	V				
watts	W				

***REGIONAL OPERATIONAL PLAN SF.2A.2013.16***

**NORTHERN COOK INLET CHINOOK AND COHO SALMON  
ESCAPMENT SURVEYS FOR 2013 - 2015**

by

Samantha Oslund

Alaska Department of Fish and Game, Sport Fish, Palmer

Alaska Department of Fish and Game  
Sport Fish

June 2013

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*Samantha Oslund,  
Alaska Department of Fish and Game, Sport Fish,  
1800 Glenn Hwy, Suite 2, Palmer, Alaska*

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ROP.SF.2A.2013.16, Palmer.*

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## Signature Page

Project Title: Northern Cook Inlet Chinook and Coho Salmon  
Escapement Surveys for 2013-2015.

Project leader(s): *Samantha Oslund, Assistant Area Management Biologist*  
*Sam Ivey, Area Management Biologist*

Division, Region and Area Sport Fish, Region II, Palmer

Project Nomenclature:

Period Covered July 2013 – October 2015

Field Dates: July 15 – October 30

Plan Type: Category I

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## Approval

Title	Name	Signature	Date
Project leader			
Research Coordinator			

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## PURPOSE

Helicopter and foot surveys of Chinook and coho salmon escapement in up to 34 NCI streams have been conducted since 1979. Aerial survey data from 24 NCI Chinook salmon streams detect trends in escapement of the various NCI stocks and are used to assist fisheries managers with future management strategies and the fine tuning of escapement goals (EGs). These counts often times are the basis for which changes to regulations are made. Escapement counts are also used collaboratively amongst managers of both Sport and Commercial Divisions as well as shared with the public, nonprofit organizations, and other agencies, both state and federal. Currently 16 Sustainable Escapement Goals (SEGs) for Chinook salmon are based on aerial counts: Little Susitna, Chulitna, Talachulitna, Chuitna, Theodore, and Lewis rivers and Clear, Goose, Little Willow, Willow, Montana, Prairie, Sheep, Alexander, Lake, and Peters creeks. Since achieving EGs is vital toward ensuring the sustainability of salmon stocks, the annual monitoring of these systems is of the highest priority for the Palmer area office.

Foot surveys of spawning coho salmon are also conducted annually on eight area streams. These streams include Cottonwood, Wasilla, Jim, McRoberts, Question, Answer, Rabideux, and Birch creeks. Several of these streams are highly urbanized and the surveys are important for future management strategies and formulation of escapement goals.

## BACKGROUND

The Northern Cook Inlet Management Area (NCIMA) supports extensive and diverse recreational fisheries for Chinook *Oncorhynchus tshawytscha* and coho salmon *O. kisutch*. The NCIMA encompasses about 30,000 square miles and includes all freshwater drainages and adjacent marine waters of Upper Cook Inlet between the latitude of the southern tip of Chisik Island and the Eklutna River, excluding the upper Susitna River drainage upstream of the Oshetna River confluence (Figure 1). About 60% of the state's population resides within or immediately adjacent to the management area. Major communities within the management area include Wasilla, Palmer, Talkeetna, Willow, and Houston. Smaller communities include Tyonek, Chickaloon, Sutton and Skwentna. The Municipality of Anchorage, Alaska's largest community borders the management area.

## OBJECTIVES

The objectives<sup>1</sup> for the escapement surveys of NCI Chinook and coho salmon stocks are:

1. Count the number of Chinook salmon in each of 24 selected NCI area streams during one survey of each stream between 15 July and 7 August.
2. Count the number of coho salmon in each of eight selected NCI area streams during one survey of each stream between 20 September and 4 October.<sup>1</sup>

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<sup>1</sup> No precision or accuracy criteria are specified because estimates are derived from one survey and surveyor variability is unknown.

# **METHODS**

## **STUDY DESIGN**

The surveys will be conducted once during peak spawning periods, as determined from past escapement surveys (Chinook) or inspection of easily accessible streams (coho) when water and viewing conditions are acceptable. Acceptable counting conditions can vary from stream to stream. Conditions that are taken into consideration include: sunlight (direct, indirect, presence of shadows), wind conditions, precipitation sufficient to obscure visibility; water clarity (sufficient to observe all underwater structures in the deepest pools). The count from a stream survey will be interpreted as a minimum number of spawning salmon escaping to that stream and will therefore be viewed only as an index of total escapement. Such indices will be assumed to be positively related to total escapement (but in an unknown manner) and comparable among years within a particular stream. Trends of indexes over years will therefore be assumed to reflect trends in actual escapements.

### **Chinook salmon**

Helicopter surveys of the escapement of Chinook salmon in 24 selected NCI streams will be conducted (Appendix A1). The 24 streams are the east and middle fork Chulitna, Chuitna, Talachulitna, Indian, Dëshka, Little Susitna, North Fork Kashwitna, Lewis, and Theodore rivers and Alexander, Clear, Goose, Lake, Willow, Little Willow, Moose, Peters, Portage, Prairie, (Anchorage), Sheep, Montana, Coal (Beluga River), Red (Johnson Creek) and Cache creek drainages. The surveys will be conducted during the peak spawning period, between 15 July to 7 August (as determined through past escapement surveys), when water and viewing conditions are acceptable. Each stream will be surveyed once.

All streams will be surveyed from the air using a helicopter with one observer. Observers will wear sunglasses with polarized lenses and will try and keep the sun behind their shoulders. The chosen air speed and height above the ground will vary with light condition and terrain but generally the aircraft will fly approximately 50 to 75 feet over the water. The area surveyed for each stream may vary from year to year depending on a number of factors, including light conditions, changes in stream morphology and visibility resulting from floods or resource development activity, the numbers of fish returning to the stream, or the presence of natural barriers such as beaver dams or log jams. Generally, the streams are surveyed from their confluence with tidewater or a glacial river, upstream to the upper-most reach to which Chinook salmon can ascend. All major clear water tributaries of each stream are also surveyed.

### **Coho Salmon**

A survey of spawning coho salmon will be conducted during the peak spawning period in nine streams by foot or canoe surveys (Appendix A2). The eight streams to be surveyed are: McRoberts, Upper Jim, Cottonwood, Wasilla, Rabideux, Birch, Question and Answer creeks. The peak spawning period will be identified through inspections of coho salmon spawning activity in streams that are easily accessible.



## DATA COLLECTION

The observer will register all Chinook and coho salmon observed during surveys on a hand tally. The following data will be recorded during each survey:

1. Stream and the respective reach/tributary area surveyed.
2. Date.
3. Type of survey.
4. Weather condition.
5. Stream level.
6. Water visibility.
7. Total number of live salmon observed.
8. Total number of dead salmon observed.

Records of escapement indices will be entered into field notebooks and subsequently transcribed.

## DATA REDUCTION AND ANALYSIS

The survey data will be summarized by species and stream. The survey conditions, total number of live and dead Chinook or coho salmon that were counted in each reach and stream will be recorded in historical stream files. Stream survey data will be presented in the Area Management Report for the Recreational Fisheries of Northern Cook Inlet in tables including historical survey data. The notebooks and original fish survey forms will be filed in the area office stream files.

## SCHEDULE AND DELIVERABLES

Dates of sampling events and other activities are summarized below. 2013 results will be published in a Report to the Board of Fisheries (FMR), in 2014, and data from 2014 and 2015 will be reported in the Area Management Report for the recreational fisheries of Northern Cook Inlet, 2014 and 2015.

## SCHEDULES AND REPORTING

<i>Date</i>	<i>Activity</i>
July 15 - October 4	Data collection
August 15	Data analysis: Chinook
October 30	Data analysis: Coho

## RESPONSIBILITIES

### List of Personnel and Duties:

**Fishery Biologist II** Oversees project by writing operational plan, coordinates and conducts the index surveys, tracking implementation of operational plan, oversees daily reporting and summarization of data, authors Area Management Report. Provides inseason data to appropriate personnel.

**Fishery Biologist III** Assists with index surveys.

**Fishery Biologist I** Conducts index surveys. Oversees daily reporting and summarization of data. Co-authors Area Management Report.

**Fish and Wildlife Technician II/III** Duties: Perform counting of coho salmon. Train crew members in how to conduct coho surveys, record data, and identify fish. Report counts and all other data to the Palmer office daily.

### BUDGET SUMMARY FY14-FY16

Line Item	Category	Budget (\$K)
100	Personal Services	0.0
200	Travel	0.0
300	Contractual	65.9
400	Commodities	1.5
500	Equipment	0.0
	Total	67.4

Budget Manager: Sam Ivey – project an increase in FY 15 and FY16 due to fluctuating flight and fuel prices.

## REFERENCE CITED

Lafferty, R. 1997. Summary of escapement index counts of Chinook salmon in the Northern Cook Inlet management area, 1958-1996. Alaska Department of Fish and Game, Fishery Data Series No. 97-8, Anchorage.

## **FIGURES**

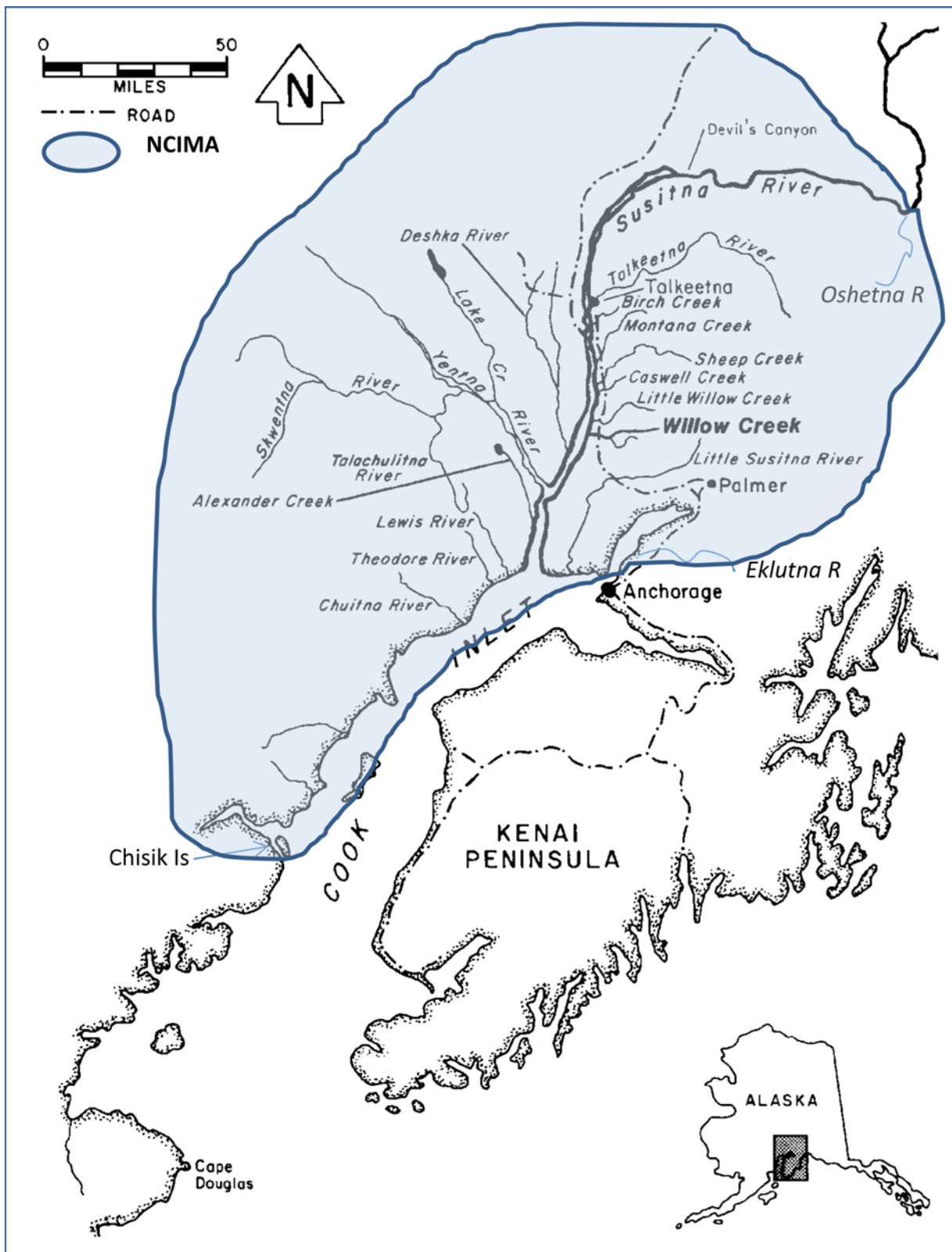


Figure 1.—Northern and West Cook Inlet management area.

**APPENDIX A: NORTHERN COOK INLET CHINOOK AND  
COHO SALMON SURVEY STREAMS.**

Appendix A1.–List of streams selected for Chinook salmon surveys in NCI.

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End points are indicated with Latitude and Longitude coordinates or obvious physical markers.

MOOSE CREEK

1. Mainstem from the confluence with the Matanuska River upstream to the Glenn Highway Bridge.
2. Mainstem from the Glenn Highway Bridge upstream to the Buffalo Mine Road Bridge near the Superior Mine.

CHUITNA RIVER (West Cook Inlet drainage)

1. Mainstem from tidewater to the confluence of Lone Creek.
2. Mainstem from the confluence of Lone Creek to the confluence of Chuit Creek.
3. Mainstem from the confluence of Chuit Creek to the confluence of Wolverine Creek.
4. Mainstem from the confluence of Wolverine Creek to the headwaters-N61.23229, W151.70207.
5. Tributaries:  
Lone Creek-N61.17699, W151.29751; Wolverine Creek-N61.25268, W151.67369; and Chuit Creek-N61.21277, W151.70207.

LEWIS RIVER

1. Mainstem from tidewater to the headwaters; no major tributaries-N61.45347, W150.83159.

THEODORE RIVER

1. Mainstem from tidewater to the headwaters; no major tributaries-N61.48817, W151.08995.

COAL CREEK

1. Confluence with Beluga River to headwaters of West Fort-N61.55801, W151.77266 and Mainstem-N61.57210, W151.76493.

ALEXANDER CREEK

1. Mainstem from the confluence with the Susitna River upstream to the confluence of Trail Creek.
2. Mainstem from the confluence of Trail Creek to the confluence of Sucker Creek.
3. Mainstem from the confluence of Sucker Creek to Alexander Lake.
4. Tributaries:  
Sucker Creek to Sucker Lake, Wolverine Creek to headwaters-N61.51137, W150.82497

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-continued-

### DESHKA RIVER

1. Mainstem from the confluence with the Susitna River upstream to Loebb's Homestead.
2. Mainstem from Loebb's Homestead upstream to the confluence of Trapper Creek.
3. Mainstem from the confluence of Trapper Creek upstream to Neil Lake.
4. Mainstem from Neil Lake upstream to the confluence of Moose and Kroto Creeks.
5. Tributaries:
  - Trapper and Chijuk Creeks
  - Moose Creek:
    1. From the confluence of Moose and Kroto Creeks upstream to Petersville Road bridge.
    2. From the Petersville Road bridge upstream to the headwaters of East Fork-N62.39734, W105.41153 and West Fork-N62.33533, W150.46620.
  - Kroto Creek:
    1. From the confluence of Kroto and Moose Creeks upstream to Petersville Road bridge.
    2. From the Petersville Road bridge upstream to the headwaters-N62.41068, W150.57660.

### LAKE CREEK

1. Mainstem from the confluence with the Yentna River upstream to Chelatna Lake.
2. Tributaries from their confluence until no more fish sited:
  - Yenlo (N62.07968 W151.01730); Home (N62.25320 W151.16231); No Name; Camp (N62.30724 W151.23127); and Sunflower Creeks (N62.36458 W151.29890).

### TALACHULITNA RIVER

1. Mainstem from the confluence with the Skwentna River upstream to the lodges near Hilene Lake.
2. Mainstem from Hilene Lake area upstream to the confluence of Talachulitna Creek.
3. Mainstem from the confluence of Talachulitna Creek upstream to the headwaters.
4. Tributaries from their confluence until no more fish sited:
  - Friday; Saturday; and Talachulitna Creeks.

### RED CREEK

1. Confluence with Johnson Creek to headwaters-N62.02861, W151.95656.

### CACHE CREEK

1. From its confluence with the Kahiltna River to the headwaters of both forks-N62.50896, W150.91794.

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-continued-

PETERS CREEK

1. Mainstem from the confluence with the Kahiltna River upstream to the confluence of Martin Creek.
2. Mainstem from the confluence with Martin Creek upstream to the headwaters-N62.53196, W150.81394.
3. Tributary:  
Martin Creek-N62.45515, W150.78267.

PORTAGE CREEK

1. Mainstem from the confluence with the Susitna River upstream to the headwaters of west fork-N62.98241, W149.10471 and east fork-N62.97684, W148.96189.

INDIAN RIVER

1. Mainstem from the confluence with the Susitna River upstream to the headwaters-N62.93153, W149.39155.

CHULITNA RIVER

1. The east fork from its confluence with the west fork and the Chulitna River to the headwaters-N63.18740, W149.23045.
2. The middle fork from its confluence with the east fork to the headwaters-N63.27765, W149.07295.

CLEAR CREEK

1. Mainstem from the confluence with the Talkeetna River upstream to the headwaters-N62.64376, W149.4770

PRAIRIE CREEK

1. Mainstem from the confluence with the Talkeetna River upstream to Stephan Lake.  
Tributary: Grizzly Creek to falls

MONTANA CREEK

1. Mainstem from the confluence with the Susitna River upstream to the Yoder Road Bridge.
2. North fork, middle fork and east fork upstream to falls.

GOOSE CREEK

1. Mainstem from the confluence with the Susitna River upstream to the confluence of Sheep Creek.

SHEEP CREEK

1. Mainstem from the confluence with the Susitna River upstream to the headwaters-N62.14196, W149.70148.

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N. FORK KASHWITNA RIVER

1. From its confluence with the Kashwitna River to the headwaters-N62.06201, W149.67786.

LITTLE WILLOW CREEK

1. Mainstem from the confluence with the Susitna River upstream to the headwaters-N61.91220, W149.52529.

WILLOW CREEK

1. Mainstem from the confluence with the Susitna River upstream to a four meter high falls in the canyon.
2. Tributaries:  
Deception Creek from confluence with Willow Creek upstream to weir.

LITTLE SUSITNA RIVER

1. Nancy Lake canoe trail (N61.59269 W150.03461) upstream to Parks Highway Bridge.
  2. Parks Highway Bridge upstream to Shrock Rd. Bridge.
  3. Shrock Rd. Bridge upstream to Welch Rd. Bridge.
  4. Welch Rd. Bridge upstream to Archangel Ck.
-

McROBERTS CREEK

1. From the culvert on Maud Road downstream to the old logging road crossing (N61.56231 W149.00248).

UPPER JIM CREEK

1. From the outlet into Leaf Lake upstream to the barrier falls.

COTTONWOOD CREEK

1. From Nicklason Lake to Cornelius Lake.
2. Nicklason Lake outlet to 2nd bridge.
3. Bogard Road upstream to the lake; downstream to slow water.
4. Seward M. Road to Mud Lake.
5. Matanuska Road to Fern Road.
6. Fern Road to Edlund Road.

WASILLA CREEK

1. Palmer Fishhook Road to Bogard Road.
2. Bogard Road to Palmer/Wasilla Highway.

Tributaries:

Spring Creek (Old Matanuska Road)

1. From the Alaska Railroad tracks to the foot of the riffle immediately down stream of the road culvert.

Spring Creek (Upper Wasilla Creek)

1. From the culvert on the subdivision road upstream to the mid-point of the meadow.
2. From the culvert on the subdivision road downstream to Wasilla Creek.

RABIDEUX CREEK

1. Sawmill Creek downstream to Rabideux Creek.
  2. Confluence of Sawmill and Rabideux Creek downstream to the Glenn Highway culvert on Rabideux Creek.
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BIRCH CREEK

1. Talkeetna Spur Road downstream to the ARR Bridge.
2. ARR Bridge downstream to the mouth.

QUESTION CREEK

1. Talkeetna Spur Road downstream to the marsh N62.22383, W150.09478.

ANSWER CREEK

1. Talkeetna Spur Road downstream to the marsh N62.2030, W150.07680.
  2. Talkeetna Spur Road upstream to old beaver dam N62.201833, W150.0638.
-